



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,372	09/28/2004	Takuya Sugawara	101249.55457US	3985

23911 7590 08/02/2006

CROWELL & MORING LLP  
INTELLECTUAL PROPERTY GROUP  
P.O. BOX 14300  
WASHINGTON, DC 20044-4300

EXAMINER

LEE, CHEUNG

ART UNIT	PAPER NUMBER
----------	--------------

2812

DATE MAILED: 08/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/509,372

Applicant(s)

SUGAWARA ET AL.

Examiner

Cheung Lee

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,5,6,8 and 13-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5,6,8 and 13-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Notice to Applicant***

1. Applicants' Amendment and Response to the Office Action mailed on April 24, 2006 has been entered and made of record.

***Response to Amendment***

2. In view of applicants' amendment to the claim, the objection to claim 6 has been withdrawn.
3. In view of applicants' amendments and arguments filed on April 24, 2006, the rejections of claims 1-12 under 35 U.S.C. 102(b) or 103(a) as stated in the indicated Office Action have been withdrawn. Applicants' arguments have been rendered moot in view of the new or modified ground of rejection given below.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 5-6, 8 and 13-18 are rejected under 35 U.S.C. 103(a) as being obvious over Murakawa et al. (JP Pat. 2000-294550; hereinafter "Murakawa") in view of Steigerwald et al. (US Pat. 6479404; hereinafter "Steigerwald") and Suzuki et al. (US Pat. 6497783; hereinafter "Suzuki").

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

5. Referring to figures 1-7 and related text, Murakawa discloses [Re claim 1] a process for producing an electronic device material, comprising: forming a film 2 on a surface of a semiconductor device substrate 1 by using a plasma based on microwave irradiation via a plane antenna member having a plurality of slits (paragraph 24), in the presence of a process gas comprising oxygen gas (paragraph 29) and a rare gas (paragraph 19). But Murakawa fails to disclose expressly a gas comprising an organic source to form a high dielectric constant film, the plasma having an electron temperature of 2 eV or less and an electron density of  $1 \times 10^{11}/\text{cm}^3$  or more.

Referring to figures 2-4 and related text, Steigerwald discloses [Re claim 13] a silicon oxide 225 on a surface of a silicon substrate 200 (col. 5, lines 25-37), and a high dielectric constant dielectric layer 230 using an organic source (col. 5, line 35-col. 6, line 5) is formed on the silicon oxide layer; [Re claim 5] wherein the high dielectric constant film is a gate insulator (col. 5, lines 5-10) of a field effect transistor (col. 4, lines 40-50); and [Re claim 16] wherein the high dielectric constant film has a dielectric constant of 7.0 or more (col. 5, lines 55-61).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use high dielectric constant film, as taught by Steigerwald, because it would have been to prevent any leakage currents through the gate dielectric.

Suzuki discloses an electron density  $10^{12}/\text{cm}^3$  or more, and an electron temperature 3 eV or less (col. 8, lines 19-30). In the case where claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F. 2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F. 2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use plasma electron's parameter, as taught by Suzuki, because it would have been to form very thin plasma layer reducing the surface damage due to incident ions, thereby enabling high quality and high speed processing even at low temperatures (Suzuki, col. 8, lines 31-34).

6. [Re claim 6] Steigerwald also discloses wherein the high dielectric constant film comprises at least one substance selected from the group consisting of: Ta<sub>2</sub>O<sub>5</sub>, ZrO<sub>2</sub>, HfO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, La<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, Y<sub>2</sub>O<sub>3</sub>, BST, Pr<sub>2</sub>O<sub>3</sub>, Gd<sub>2</sub>O<sub>3</sub>, CeO<sub>2</sub> and compounds of these substances (col. 5, lines 55-66).

7. [Re claim 8] Steigerwald also discloses wherein the high dielectric constant film is formed at a temperature of 250 to 500°C (col. 6, lines 45-52) and has a carbon concentration (col. 6, lines 1-5). In the case where claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F. 2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F. 2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990). Steigerwald fails to disclose expressly wherein the carbon concentration is 15% or less. However, any variation in carbon concentration in the present claim is obvious in light of the cited art, because the changes in carbon concentration produce no unexpected function. The routine varying of parameters to produce expected changes are within the ability of one of ordinary skill in the part. Patentability over the prior art will only occur if the parameter variation produces an unexpected result. *In re Aller, Lacey and Hall*, 105 USPQ 233, 235. *In re Reese* 129 USPQ 402, 406.

8. Murakawa discloses [Re claim 14] wherein the process gas includes a carrier gas (paragraphs 19 and 62).
9. Murakawa discloses [Re claim 15] wherein the semiconductor device substrate has a diameter of about 300 mm (paragraphs 52-53).
10. [Re claims 17-18] Steigerwald also discloses wherein organic source is an organometallic compound; and wherein the organic source is selected from the group consisting of  $\text{Ta}(\text{OC}_2\text{H}_5)_5$ ,  $\text{Zr}(\text{OC}_4\text{H}_9)_4$  and  $\text{Hf}(\text{OC}_4\text{H}_9)_4$  (col. 5, line 65-col. 6, line 5).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cheung Lee whose telephone number is 571-272-5977.

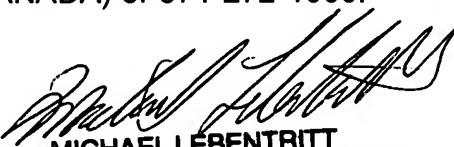
The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Cheung Lee

July 21, 2006

  
MICHAEL LEBENTRITT  
SUPERVISORY PATENT EXAMINER